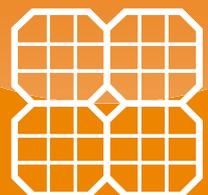




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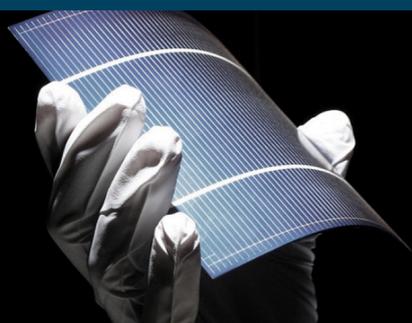
## CLIMATE CHAMBER SOLAR SIMULATOR

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## CLIMATE CHAMBER SOLAR SIMULATOR

New PV technologies claim to be more efficient, cost less and have longer life cycles. To prove that your PV technology is most reliable, you need a dedicated setup. Our class AAA climate chamber solar simulators allow you to get unprecedented performance and reliability data to gain new research insights. It is perfectly suited for testing current and next generation solar cells and modules such as high efficiency crystalline, hetero-junctions, perovskites and other thin films. With the equipment you will be able you to get a better understanding of your PV technology's behaviour in local and extreme conditions with a wide range of relative humidity, temperatures and sunlight. With proof of the durable performance of your PV technology, you will be able to leave your mark for a more sustainable and clean future.



## Unique features

Eternal Sun provides high quality solar testing equipment that outperforms other technologies with the combination of the following unique features.



### AAA-accuracy

The unique solar simulation technique applied by Eternal Sun is able to provide AAA-class sunlight inside the climate chamber, complying with the highest IEC 60904-9 standards for spectral match, uniformity and stability.



### Steady state

Our equipment produces continuous artificial sunlight that stays constant over long periods of time, creating clearly defined standard conditions to make sure that results are reproducible. A shutter provides pulsed illumination for low temperature tests.



### Any size

The modular product design allows us to be flexible and provide customers with equipment that suits their needs; we provide solutions for both cell and module research, starting from 50 cm x 50 cm test surfaces up to 1.6 m x 1.1 m.

## Applications

In the solar energy industry, improving the performance and reliability of products and systems is key. This requires a dedicated test setup. Our climate chamber solar simulator can be used for

many different applications, providing in-depth knowledge about the behaviour of solar products.



### Performance testing

The climate chamber solar simulator allows you to carry out I-V curve measurements to determine the basic parameters of your PV modules and cells: power output, efficiency, open circuit voltage, short circuit current, resistances, etc. This can be done under various circumstances. Irradiance, temperature and humidity can be changed by computer control, according to pre-programmed settings and cycles. The setup also enables light soaking, pre-conditioning and endurance tests.



### Weathering testing

Solar technologies encounter harsh degradation conditions during their service life. With the climate chamber solar simulator these local or extreme conditions can be replicated and accelerated in laboratory settings, in order to test resistance to sunlight, temperature fluctuations, humidity freeze and damp heat. Uniquely, performance testing and weathering can be carried out simultaneously, and electric parameters can be monitored in-situ.



## Main benefits

**Wide range of humidity and temperatures with sunlight** exceeding the relative humidity and temperature ranges required by the IEC standards for testing and certification. Furthermore, it enables extreme combinations of conditions such as 85 %rH, 85 °C and 1000 W/m<sup>2</sup> sunlight.

**Simultaneous performance testing and weathering** allows for a more realistic idea of cells or module performance and reliability while simulating local or extreme climatic conditions.

**Class AAA sunlight inside climate chamber** according to IEC 60904-9.

### Compact system & flexible use

allowing the simulator and climate chamber to be used separately with full functionality.

### Full day cycle simulation

that enables to perform 1,000 hour cycles of weathering with class AAA illumination.

### Low cost of ownership

due to price competitive lamps, compared to that of traditional Xenon weatherometers.

### Turnkey and low maintenance

running for 1800 hours non-stop with lamps that are easy to replace.

### Computer control

allowing to set and program parameters like relative humidity, temperature, and light intensity.

### Add-ons available

IV characterization equipment

Multiplex system for monitoring 32 cells simultaneously

UV pre-conditioning rack

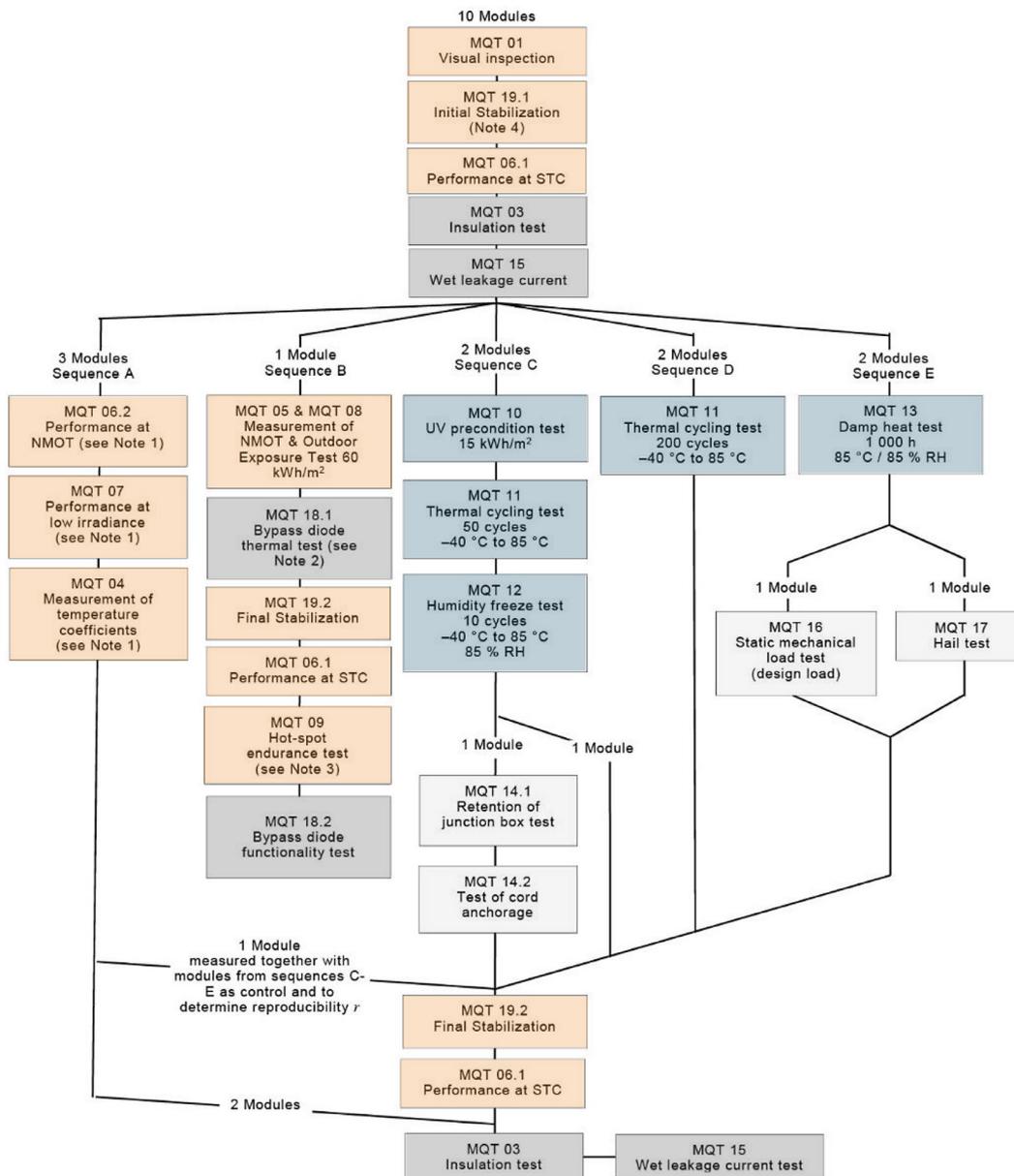
Controllable UV-A & UV-B lamps

# Eternal Sun test procedures overview

IEC 61215 (new 2016 edition)

All PV module technologies

Design qualifications and type approval



Eternal Sun Large area solar simulator scope

Eternal Sun Climate chamber solar simulator additional scope

Eternal Sun add-on equipment scope

Sourced from third party

